- a fraction by mass of segments with LCST of between 2% and 15%, and

- an average molecular mass of the segments with LCST greater than 4 000 or an average number of atoms along a segment with LCST greater than 90.

In the present description, the viscosity is that obtained at a shear rate of 10 s^{-1}.

It is also possible, in the context of the invention, to include in the separation medium, in addition to the copolymer(s) with a thermothickening character, other species not exhibiting these properties, such as in particular water-soluble polymers, nonthermothickening associative polymers, or else neutral or ionic surfactants, provided that these adjuvants do not give rise to demixing in the separation medium or to a loss of the reversible thermothickening character. Such adjuvants may be advantageous for modulating the properties and/or the separating power of the said medium. It is in particular known that the addition of certain surfactants may in some cases reinforce the association between polymers, and therefore the thermothickening character. It may also be advantageous to add to the medium associative or nonassociative polymers of low molecular weight in order to enhance the separation of the smallest analytes contained in a mixture without adversely affecting the overall viscosity, as is known in contexts different from that of the invention.

The subject of the present invention is also the use of a separation medium as defined above for the separation or analysis of species among molecular or macromolecular species, and in particular biological macromolecules such as nucleic acids (DNA, RNA, oligonucleotides), nucleic acid analogues obtained by chemical synthesis or modification, proteins,

polypeptides, glycopeptides and polysaccharides, organic molecules, synthetic macromolecules or particles such as mineral particles, latex, cells or organelles.

It is particularly useful for the sequencing of DNA, for which it makes it possible to obtain optimum separation conditions linked to a high viscosity, to a high temperature for which the resolution of compressions is good and the separation rapid, while preserving, at room temperature, a moderate viscosity allowing easy injection of DNA.

However, the possibility offered by the invention of considerably varying the viscosity of the medium by changing temperature is also advantageous for other applications.

It is in particular advantageous every time an increase in the rigidity or the viscosity of the medium contained in a capillary or a microchannel might be desirable. For example, a high viscosity makes it possible to reduce the electrohydrodynamic effects responsible for a poor separation of large DNAs in a pulsed field and more generally to reduce the damaging hydrodynamic flows in a capillary or a microchannel.

It should also be noted that although the media according to the invention in general best exert their beneficial effect by means of a change in temperature, they are also suitable for use at constant temperature. They may thus be suitable for introduction into the separating channel and for the consecutive separation of analytes at the same temperature. This may be advantageous in particular if an apparatus is available which is capable of introducing into the separating channel a medium of high viscosity, and/or which does not make it possible to easily modify the temperature

between the introduction of the said medium into the channel and the separation of the analytes.

Another advantage of the high viscosities allowed by the media according to the invention is that they reduce electroosmosis (see for example Bello et al., Electrophoresis 15, 623, 1994), without a need to use other methods for suppressing electroosmosis known to persons skilled in the art, such as for example the use of polymers having affinity for the wall of the capillary, or else the grafting of neutral hydrophilic polymers onto the surface. If the suppression of electroosmosis or the interaction of the analytes with the walls produced by the media according to the invention is not sufficient for a particular application, it is possible to combine the invention with one of these processes known to persons skilled in the art, and to thus obtain properties which are even better than those obtained with these methods used alone.

Advantageously, it is possible to modulate the separating properties of the claimed medium via the selection of a copolymer in accordance with the invention and whose thermothickening effect is more particularly optimized for the separation of species of different sizes.

By way of illustration of this type of adaptation which is accessible according to the invention, it is possible in particular:

- to separate molecules having a molecular mass of less than 50 000 or oligonucleotides comprising less than 100 nucleotides, or else native or denatured proteins with a medium transiting from a viscosity V1 of between 50 and 1 000 $mPa.m^{-1}.s^{-1}$ at a temperature T1 of between 15 and 30°C to a viscosity V2 which is greater than V1 by a factor